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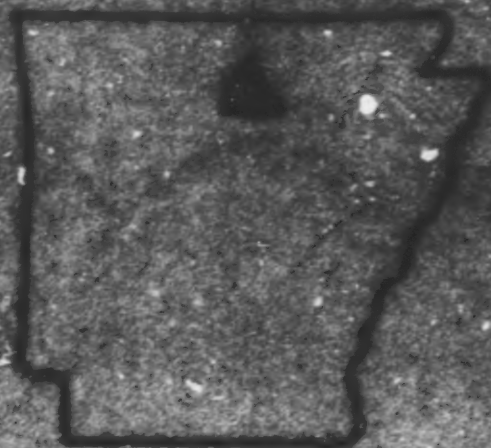
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ORIGINAL

FLOOD INSURANCE STUDY



STARK COUNTY,
MISSOURI
FLOOD-PRONE AREAS



JULY 12, 1967

Federal Emergency Management Agency

COMMUNITY PLANNING BOARD

**NOTICE TO
FLOOD INSURANCE STUDY USERS**

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
UNINCORPORATED AREAS OF STONE COUNTY, ARKANSAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the unincorporated areas of Stone County, Arkansas, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in their efforts to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by the Little Rock District of the U. S. Army Corps of Engineers (COE) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. BW-84-E-1506, Project Order No. 1, Amendment No. 7. This work was completed in April 1985.

1.3 Coordination

An initial Consultation and Coordination Officer's (CCO) meeting was held on July 21, 1983, to determine the streams to be studied by detailed methods. This meeting was attended by representatives of FEMA, the community, and the COE (the study contractor). The County of Stone, the City of Clinton, and the Arkansas Highway and Transportation Department were contacted for information during the course of this study. On August 12, 1986, a final CCO meeting, attended by representatives of FEMA, the community, and the study contractor, was held to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

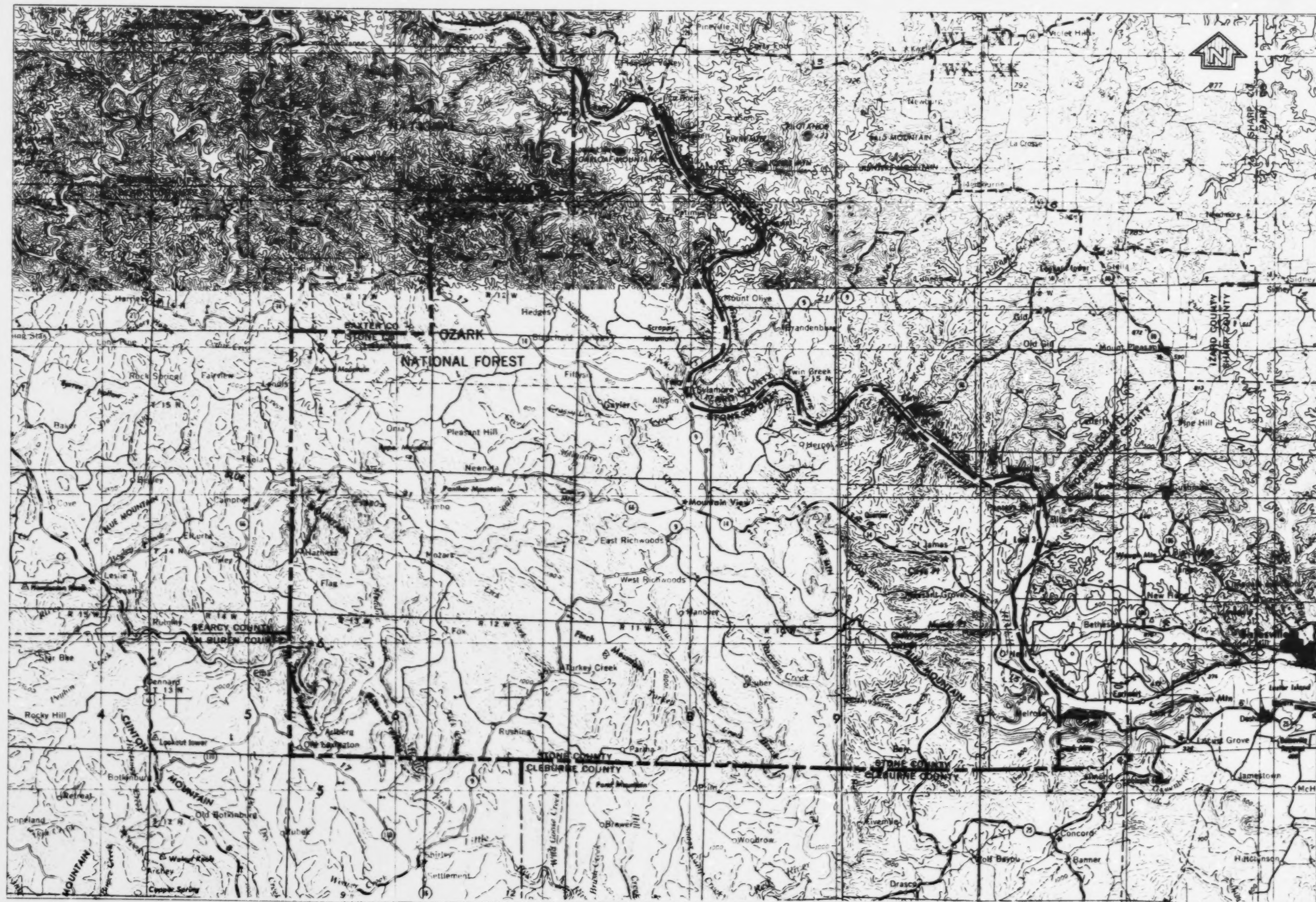
This Flood Insurance Study covers the unincorporated area of Stone County, Arkansas. The City of Mountain View and the City of Fifty Six, located within the boundaries of Stone County, are not included in the study. The area of study is shown on the Vicinity Map (Figure 1).

The following streams were studied by detailed methods: the White River, from river mile 326.40 to river mile 364.00; South Sylamore Creek, from its confluence with the White River to river mile 5.94; Rocky Bayou, from river mile 8.20 to river mile 11.82; Livingston Creek, from its confluence with the White River to river mile 4.04; Mill Prong, for its entire length within the corporate limits; and Mill Prong Tributary, from its confluence with Mill Prong to river mile 1.71. The stream distances for this study are measured in river miles. River miles identify known locations along the streams in Stone County; actual measured miles along the channel may not correspond to given river miles. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction through April 1990.

Wolf Bayou, Brier Creek, Wallace Creek, Mill Creek, Alder Creek, Cove Prong, Lick Fork, Hughes Creek, Tubbs Creek, Middle Fork Little Red River, Turkey Creek (Beech Fork), Cagens Creek, and portions of the White River, Rocky Bayou, and South Sylamore Creek were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and Stone County.

2.2 Community Description

Stone County is located in the north central portion of the State of Arkansas. It is bordered by the unincorporated areas of Van Buren and Searcy Counties to the west, the unincorporated areas of Baxter County to the northwest, the White River and the unincorporated areas of Izard County to the northeast, the unincorporated areas of Independence County to the east, and the unincorporated areas of Van Buren and Cleburne Counties to the south. Stone County is approximately 45 miles south of the Missouri-Arkansas state line. The county is approximately 37 miles southeast of Mountain Home, Arkansas, and approximately 28 miles northwest of Batesville, Arkansas.



APPROXIMATE SCALE

12 MILE

VICINITY MAP

FEDERAL EMERGENCY MANAGEMENT AGENCY

STONE COUNTY, AR
(UNINCORPORATED AREAS)

FIGURE 1

The climate in Stone County is humid with variable temperature. The average annual temperature for this area is 59 degrees Fahrenheit (°F). Summers are moderately long and hot, and daily maximum temperatures occasionally exceed 100°F. Winters are moderately short and cold. The average annual precipitation for the area is approximately 50 inches. Precipitation is fairly uniformly distributed throughout the year, with heavier amounts occurring in the spring and lesser amounts occurring in the summer. Intense thunderstorms do occur in the summer and may release large amounts of rain over a small area in a short period of time. Snowfall is light with the area receiving approximately 9 inches a year.

Most of the county is on hilly land that is not subject to flooding; however, some areas are within the flood plains of the White River and the Middle Fork Little Red River and their tributaries. New residential development is occurring generally along each of the streams in the study.

2.3 Principal Flood Problems

No major floods on the White River have been experienced in Stone County since the completion of the White River Multiple Purpose Reservoirs; however, the White River System has been modeled using 35 years of records simulating the reservoirs in existence (Reference 1). These discharge data were used, along with rating curves, to determine flood elevations along the White River in Stone County. The Calico Rock Gage data on the White River were used in this analysis.

The upstream portions of the watersheds of the streams in this study are continuing to develop. This will require flood plain management to avoid flood damages since increases in runoff will occur.

2.4 Flood Protection Measures

Four COE multiple-purpose dam and reservoir projects are upstream from Stone County. These reservoirs are Beaver, Table Rock, and Bull Shoals (located on the White River), and Norfork (located on the North Fork River). Each reservoir provides storage for flood control. The drainage area controlled by these projects is 7,842 square miles. A total of 4,152,000 acre-feet of storage in these projects is reserved exclusively for storage of flood flows on the White River and the North Fork River. Since these projects became operational, flood flows on the White River at Stone County have been greatly reduced; however, there are 2,136 square miles of drainage area uncontrolled above Calico Rock and 2,396 square miles uncontrolled above the State Route 9 bridge crossing the White River.

Lock and Dam No. 3 on the White River at river mile 320.11 was constructed around the turn of the century. This structure is obsolete with the lock inoperable and the dam functioning as an uncontrolled weir. The difference in headwater and tailwater amounts to less than 1 foot during the 100-year flood.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the county.

Peak discharges for the White River were obtained from the detailed and extensive engineering studies on the White River Multiple Purpose Reservoir System. This comprehensive program calculates the discharge/frequency data used in this study. Peak discharges for South Sylamore Creek, Rocky Bayou, Livingston Creek, Mill Prong, and Mill Prong Tributary were developed using the HEC-1 computer program (Reference 2).

Peak discharge-drainage area relationship for the White River, South Sylamore Creek, Rocky Bayou, Livingston Creek, Mill Prong, and Mill Prong Tributary are shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10-YEAR</u>	<u>50-YEAR</u>	<u>100-YEAR</u>	<u>500-YEAR</u>
WHITE RIVER					
At river mile 342.7	10,238.00	112,000	254,000	354,500	715,000
SOUTH SYLAMORE CREEK					
At its confluence with the White River	206.37	53,074	80,202	91,522	112,277
ROCKY BAYOU					
At river mile 8.2	28.34	17,104	23,134	25,685	30,743
LIVINGSTON CREEK					
At its confluence with the White River	21.32	10,939	14,944	16,668	19,851
MILL PRONG					
At river mile 0.8	3.40	14,763	20,204	22,320	26,541
MILL PRONG TRIBUTARY					
At river mile 0.8	3.24	9,641	12,510	13,716	16,225

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections were developed by field surveys for all detailed streams in the study area. All hydraulic structures were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 3). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. The starting water-surface elevations for the White River, Rocky Bayou, Mill Prong,

and Mill Prong Tributary were taken from known elevations. The starting water-surface elevations for South Sylamore Creek and Livingston Creek were determined using the slope/area method.

Roughness factors (Manning's "n") used in the hydraulic computations were obtained by engineering judgment and field investigations of the streams and overbank flood plain areas. The channel and overbank "n" values for the streams studied by detailed methods are shown in the following tabulation:

<u>Stream</u>	<u>Channel "n"</u>	<u>Overbank "n"</u>
White River	0.024-0.035	0.035-0.150
South Sylamore Creek	0.013-0.069	0.080-0.180
Rocky Bayou	0.049-0.060	0.120
Livingston Creek	0.024-0.060	0.014-0.130
Mill Prong	0.035-0.060	0.100-0.150
Mill Prong Tributary	0.024-0.053	0.120-0.150

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year flood plain boundaries and 100-year floodway to assist communities in developing flood plain management measures.

4.1 Flood Plain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the streams studied in detail, the 100- and 500-year flood plain boundaries have been delineated using the flood

elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 20 feet (Reference 4).

For the streams studied by approximate methods, the boundary of the 100-year flood has been delineated using topographic maps (Reference 4).

The 100- and 500-year flood plain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year flood plain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE), and the 500-year flood plain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year flood plain boundaries are close together, only the 100-year flood plain boundary has been shown. Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year flood plain boundary is shown on the Flood Insurance Rate Map (Exhibit 2).

4.2 Floodways

Encroachment on flood plains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood plain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the flood plain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 2). The computed floodways are shown on the Flood Insurance Rate

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY	INCREASE
White River								
A	331.40 ¹	1,242 ³	35,901	9.9	319.0	319.0	319.9	0.9
B	333.40 ¹	802 ³	30,307	11.7	322.9	322.9	323.7	0.8
C	340.00 ¹	988 ³	42,155	8.4	335.0	335.0	335.9	0.9
D	343.00 ¹	1,843 ³	55,568	6.4	342.0	342.0	342.9	0.9
E	346.50 ¹	1,170 ³	44,907	7.9	347.9	347.9	348.7	0.8
F	347.00 ¹	1,138 ³	40,291	8.8	348.2	348.2	349.0	0.8
G	347.80 ¹	1,046 ³	39,408	9.0	349.7	349.7	350.6	0.9
H	352.80 ¹	1,312 ³	43,184	8.2	358.9	358.9	359.8	0.9
I	356.30 ¹	1,462 ³	50,854	7.0	364.3	364.3	365.1	0.8
J	360.00 ¹	975 ³	39,273	9.0	371.0	371.0	371.0	0.9
South Sylamore Creek								
A	1.68 ²	342	8,816	7.3	339.9	332.7 ⁴	333.7	1.0
B	5.53 ²	593	12,113	5.0	362.8	362.8	363.8	1.0
C	5.94 ²	260	4,998	11.2	364.6	364.6	365.5	0.9
Rocky Bayou								
A	8.20 ²	414	5,324	4.8	400.7	400.7	401.7	1.0
B	8.66 ²	803	8,160	3.1	405.9	405.9	406.9	1.0
C	9.16 ²	240	2,955	8.7	412.7	412.7	413.3	0.6
D	11.20 ²	192	2,778	7.8	467.9	467.9	468.9	1.0
E	11.82 ²	221	2,343	9.5	484.4	484.4	485.4	1.0

¹River miles above confluence with Mississippi River

²River miles above confluence with White River

³This width extends beyond corporate limits

⁴Elevation computed without consideration
of backwater from White River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

STONE COUNTY, AR
(UNINCORPORATED AREAS)

FLOODWAY DATA

WHITE RIVER-SOUTH SYLAMORE CREEK-ROCKY BAYOU

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
(FEET NGVD)								
Livingston Creek								
A	0.85 ¹	152	1,671	10.0	345.8	327.3 ⁴	327.5	0.2
B	1.13 ¹	160	1,816	9.1	345.8	333.0 ⁴	334.0	1.0
C	4.04 ¹	96	618	12.0	442.0	442.0	443.0	1.0
Mill Prong								
A	0.78 ²	130	1,895	11.8	530.5	530.5	531.5	1.0
B	1.75 ²	364	4,170	3.3	610.1	610.1	611.1	1.0
Mill Prong Tributary								
A	0.19 ³	211	1,901	7.2	613.8	613.8	614.8	1.0
B	0.41 ³	190	2,194	6.3	626.8	626.8	627.8	1.0
C	1.36 ³	200	2,052	1.5	691.7	691.7	692.7	1.0
D	1.49 ³	197	633	5.0	692.6	692.6	693.3	0.7
E	1.71 ³	55	263	12.0	710.5	710.5	710.9	0.4

¹River miles above confluence with White River

²River miles above confluence with Rocky Bayou

³River miles above confluence with Mill Prong

⁴Elevation computed without consideration of
backwater from White River

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

STONE COUNTY, AR
(UNINCORPORATED AREAS)

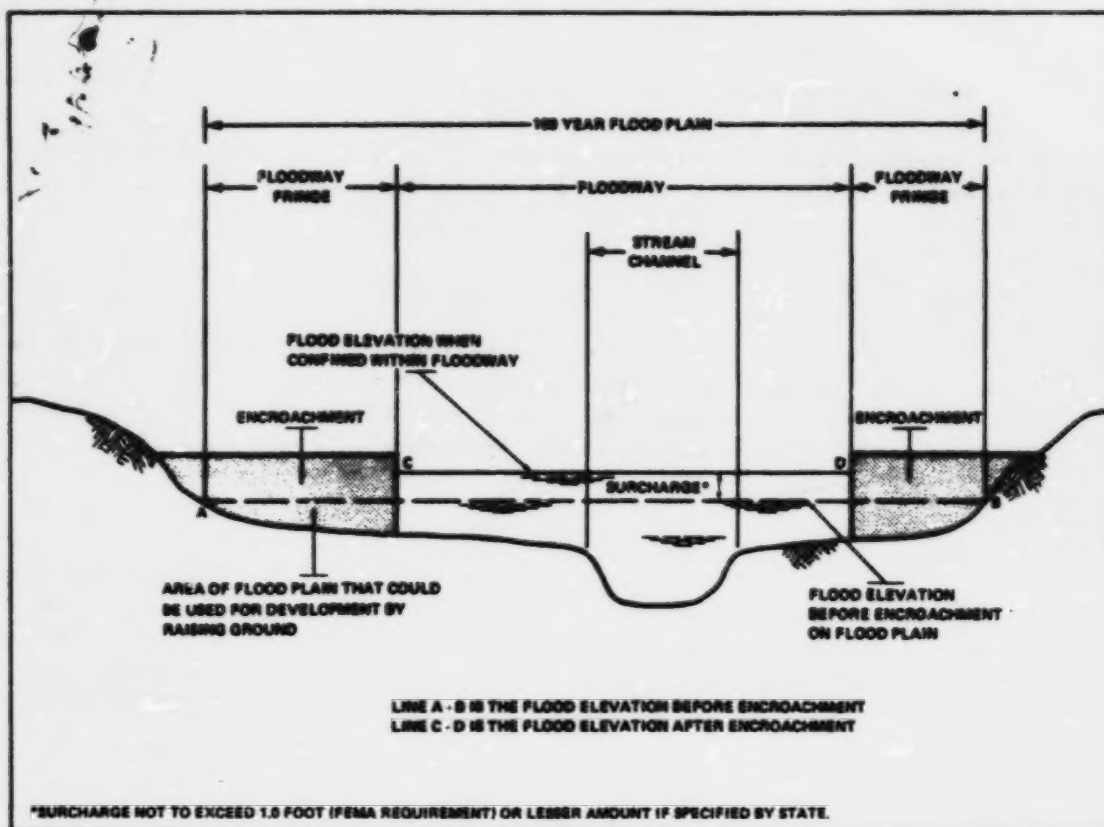
FLOODWAY DATA

LIVINGSTON CREEK-MILL PRONG-MILL PRONG TRIBUTARY

BEST COPY AVAILABLE

Map (Exhibit 2). In cases where the floodway and 100-year flood plain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway widths for the White River extend beyond the county boundary.

The area between the floodway and 100-year flood plain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.



FLOODWAY SCHEMATIC

Figure 2

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 2 for certain downstream cross sections of South Sylamore Creek and Livingston Creek are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year flood plains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year flood plains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year flood plain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal flood plains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal flood plains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year flood plain, areas within the 500-year flood plain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and flood plain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year flood plains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For flood plain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year flood plains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

The Flood Insurance Study for the City of Calico Rock has been prepared (Reference 5). Profiles for the White River in that study do not agree with the profiles in this study. The profiles for the White River developed for this study were developed using latest and best available hydrologic and hydraulic data. When the study for Calico Rock is revised, it will be in agreement with this study.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, Federal Center, Denton, Texas 76201.

9.0 BIBLIOGRAPHY AND REFERENCES

1. U. S. Army Corps of Engineers, South Western Division, Regulation, Simulation and Analysis of Simulation for a Multiple Purpose Reservoir System - "SUPER", Dallas, Texas, 1976.
2. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-1 Flood Hydrograph Package, Davis, California, July 1982.
3. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, March 1982.
4. U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 20 Feet: Bethesda, Arkansas, 1942; Boswell, Arkansas, 1964; Calico Rock, Arkansas, 1964; Concord, Arkansas, 1973; Drasco, Arkansas, 1973; Fiftyvix, Arkansas, 1972; Fox, Arkansas, 1969; Guion, Arkansas, 1964; Landis, Arkansas, 1972; Marcella, Arkansas 1969; Mountain View Southwest, Arkansas, 1969; Mountain View, Arkansas, 1969; Mount Pleasant, Arkansas, 1976; Norfork Dam South, Arkansas, 1981; Norfork Southeast, Arkansas, 1966; Old Lexington, Arkansas, 1973; Onia, Arkansas, 1972; Oxley, Arkansas, 1973; Parma, Arkansas, 1973; Prim, Arkansas, 1973; Shirley, Arkansas, Photorevised 1981; Sylamore, Arkansas, Photorevised 1975.

5. Federal Emergency Management Agency, Federal Insurance Administration,
Flood Insurance Study, City of Calico Rock, IZARD County, Arkansas,
Washington, D. C., December 4, 1979.

EXHIBIT 3 - ELEVATION REFERENCE MARKS

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 1	05	371.29	State Survey standard disk, stamped P-16 1934, set in top of concrete post, 48 feet north of center line of Missouri-Pacific Railroad track, 7 feet east of center line of gate, 2 feet south of right-of-way fence, 23 feet northeast of tenth pole northwest of Milepost 343, 49 feet north of center of road crossing, Section 21, T17N, R11W.
RM 2	05	367.13	Standard disk, stamped M 39 1934, in top of limestone ledge of bluff, 13 feet north of center line of Missouri-Pacific Railroad track, 0.13 mile west of Calico Rock Station, approximately 0.1 mile east of tenth pole west of Milepost 341, approximately 295 feet east of switch stand at west end of switch, Section 22, T17N, R11W.
RM 3	05	363.79	State Survey standard disk, stamped P-12 1934, set in top of concrete post, 17 feet north of center line of Missouri-Pacific Railroad, approximately 195 feet east of Calico Rock Station, 48 feet west of twelfth pole west of stand south of track, Section 23, T17N, R11W.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 4	10	358.66	State Survey standard disk, stamped P-32 1934, set in top of concrete post, 36 feet northeast of center line of Missouri-Pacific Railroad track, 17 feet southwest of right-of-way fence, approximately 0.2 mile southeast of switch at Creswell, approximately 80 feet northwest of tenth pole northwest of Milepost 339, 58 feet southeast of center of south end of Bridge 65 over Cat Creek, Section 36, T17N, R11W.
RM 5	10	363.64	Standard disk, stamped P 39 1934, in top of limestone ledge at east end of limestone cut, 35 feet northeast of center line of Missouri-Pacific railroad track, approximately 75 feet northwest of twenty-fifth pole northwest of Mileport 337, approximately 60 feet north of masonry culvert, Section 1, T16N, R11W.
RM 6	10	357.35	State Survey standard disk, stamped P-33 1934, set in top of concrete post, 15 feet north of center line of Missouri-Pacific Railroad track, 48 feet west of twenty-sixth pole northwest of Milepost 336, 18 feet northwest of farm road crossing, 4.5 feet northwest of crossing sign, Section 6, T16N, R10W.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 7	10	354.23	Standard disk, stamped Q 39 1934, in top of north end of north concrete wing wall of west abutment of Missouri-Pacific Bridge 52 over Piney Creek, 8.5 feet north of center line of track, 8 feet south of fourth pole northwest of Milepost 335, Section 8, T16N, R10W.
RM 8	30	460.04	1/2-inch reinforcing bar driven in ground in wooded area, 137 feet east of center line of Highway 5, 565 feet east of east bank of Livingston Creek, SE1/4, Section 23, T16N, R11W, approximately 2,200 feet north of south east-west line of Section 23.
RM 9	30	409.23	1/2-inch reinforcing bar driven in ground, approximately 122 feet southeast of center line of Highway 5, approximately 227 feet southeast of southeast bank of Livingston Creek, section 26, T16N, R11W, approximately 2,100 feet south of north east-west line of Section 26.
RM 10	30	377.22	Chiseled square in center of southwest headwall to 24-inch culvert under Highway 5, approximately 275 feet northeast of northeast bank of Livingston Creek, SE1/4, Section 26, T16N, R11W, approximately 450 feet north of south east-west line of Section 26.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 11	30	362.06	Chiseled square in center of concrete bridge across Livingston Creek for gravel road, approximately 550 feet southeast of intersection of that road with Highway 5, SE1/4, Section 26, T16N, R11W, approximately 50 feet north of south east-west line of Section 26.
RM 12	30	352.05	Railroad spike in center line of Highway 5, approximately 158 feet north of north bank of Livingston Creek, Section 25, T16N, R11W, approximately 2,150 feet east along Highway 5 of west north-south line of Section 25.
RM 13	30	357.83	Railroad spike in pavement at southwest edge of Highway 5, approximately 580 feet east of north bank of Livingston Creek, NW1/4, Section 31, T16N, R10W, approximately 550 feet southeast along Highway 5 of west north-south line of Section 31.
RM 14	30	351.38	Standard disk, stamped R-39 1934, in top of east end of south wing wall of Missouri-Pacific Railroad Bridge 61, 8 feet northeast of center line of track, approximately 0.5 mile northwest of station at Boswell, approximately twelve poles northwest of Milepost 334, Section 16, T16N, R10W.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 15	30	345.45	State Survey standard disk, stamped P-31 1934, set in top of concrete post, 48 feet southwest of center line of Missouri-Pacific Railroad track, 2 feet northeast of right-of-way fence, approximately 250 feet northwest of station at Boswell, at switch, approximately 115 feet northwest of water tank, Section 16, T16N, R10W.
RM 16	30	348.04	Standard disk, stamped S 39 1934, in top of limestone ledge, 10 feet south of center line of Missouri-Pacific Railroad track, approximately 1.6 miles south of switch at Boswell, approximately 130 feet west of tenth pole north of Milepost 332, in cut, Section 21, T16N, R10W.
RM 17	30	346.95	Standard disk, stamped T 39 1934, in top of sandstone outcrop, 10 feet southeast of center line of Missouri-Pacific Railroad track, approximately 30 feet west of twenty-second pole north of Milepost 330, at north end of cut, Section 30, T16N, R10W.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 21	50	338.29	1/2-inch reinforcing bar driven in ground at edge of wooded area, approximately 340 feet north of north bank of Livingston Creek, approximately 120 feet west of west bank of White River, Section 21, T16N, R10W, approximately 1,820 feet north of south east-west line of Section 31.
RM 22	50	339.59	Standard disk, stamped V 39 1934, in top of limestone shelf of wall approximately 130 feet long and 25 feet high, 9 feet southeast of center line of Missouri-Pacific track, 1.6 miles north of Sylamore Station along railroad, approximately sixteen poles north of Milepost 326, 27 feet east of small wooden culvert, Section 17, T15N, R10W.
RM 23	50	335.99	Standard disk, stamped U-17 1932, set in top of concrete post, 17 feet east of center line of main track of Missouri-Pacific Railroad track, 69 feet north of north end of Sylamore Station, approximately 75 feet south of old walk, 28 feet west of pole, Section 19, T15N, R10W.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 18	30	349.48	State Survey standard disk, stamped P-21 1934, set in top of concrete post, 79.8 feet east of center line of Missouri-Pacific Railroad track, 41.8 feet east of southeast corner of station at Mount Olive, 11.5 feet east of twentieth pole north of Milepost 329, 18.5 feet west of right-of-way fence, Section 31, T16, R10W.
RM 19	30	344.04	A standard disk, stamped U 39 1934, in top of sandstone outcrop, 23 feet northeast of center line of Missouri-Pacific Railroad, approximately 225 feet north of farm road crossing, approximately 50 feet northwest of twenty-second pole north of Milepost 328, approximately 70 feet northeast of 3-foot concrete culvert, Section 5, T15N, R10W.
RM 20	30	341.65	State Survey standard disk, stamped P-20 1934, set in top of concrete post, 47 feet east of center line of Missouri-Pacific Railroad track, approximately 90 feet northeast of hand car set-off, 14 feet east of third pole north of Milepost 328, Section 5, T15N, R10W.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 24	50	333.56	Standard disk, stamped V-17 1932, set in top of concrete post, 42 feet east of center line of main track of Missouri-Pacific Railroad, 5 feet north of pole, approximately 1,000 feet south of Sylamore Station, west of Standard Oil Company storage plant, 124 feet south of center of grade crossing of road leading to ferry, Section 19, T15N, R10W.
RM 25	50	333.12	State Survey standard disk, stamped B-28 1934, set in top of concrete post, 10.4 feet north of center line of main track of Missouri-Pacific Railroad, approximately 0.14 mile east of station at Ruddells, approximately 190 feet east of east end of Bridge 51, 14 feet south and 63 feet west of southwest corner of corrugated-iron warehouse, NW1/4, NE1/4, Section 30, T15N, R10W.
RM 26	50	343.23	Chiseled square above third pier from north end and in center of concrete Highway 87 bridge over South Sylamore Creek, NW1/4, Section 21, T15N, R11W.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 27	50	337.23	Spike in 10-inch Elm tree, near north bottom of South Sylamore Creek, NE1/4, Section 21, T15N, R11W, approximately 640 feet west of east north-south line of Section 21, approximately 550 feet south of north east-west line of Section 21.
RM 28	50	332.95	Spike in 10-inch Sycamore tree on gravel bar, on north side of South Sylamore Creek, Section 22, T15N, R11W, approximately 2,550 feet east of west north-south line of Section 22.
RM 29	50	360.49	Spike in base of 8-inch Elm tree, approximately 635 feet north of north bank of South Sylamore Creek, SW1/4, Section 14, T15N, R11W, approximately 175 feet north of south east-west line of Section 14, approximately 1,380 feet east of west north-south line of Section 14.
RM 30	50	321.41	Spike in 6-inch Sweet Gum tree, on right bank of South Sylamore Creek, Section 14, T15N, R11W, approximately 2,730 feet west of east north-south line of Section 14.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 31	50	302.56	Chiseled square on top of curb at southwest corner of southwest end of Private Road bridge over South Sylamore Creek, Section 14, T15N, R11W, approximately 1,950 feet west of east north-south line of Section 14.
RM 32	50	322.34	Top of concrete right-of-way marker, approximately 275 feet (along south side of Highway 14) southwest of southwest end of bridge over South Sylamore Creek, Section 14, T15N, R11W.
RM 33	50	337.81	Chiseled square on east side of south end of Highway 5 bridge over South Sylamore Creek, Section 13, T15N, R11W.
RM 34	55	331.37	Standard disk, stamped W 39 1934, in south slope of limestone outcrop, approximately 35 feet north of center line of Missouri-Pacific Railroad track, approximately 130 feet west of Milepost 322, approximately 45 feet northwest of center line of road crossing, Section 21, T15N, R10W.
RM 35	55	324.93	Standard disk, stamped X 39 1934, in top of south end of east abutment of Missouri-Pacific Railroad Bridge 45 over Twin Creek, 8 feet south of center line of track, at Milepost 320, Section 14, T15N, R10W.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 36	55	326.21	Standard disk, stamped Y 39 1934, in ledge of limestone outcrop, 15 feet northeast of center line of Missouri-Pacific Railroad track, at siding at Hanford, approximately 60 feet southeast of fifth pole northwest of Milepost 318, Section 26, T15N, R10W.
RM 37	55	322.05	Standard disk, stamped Z 39 1934, in top of limestone boulder, 15 feet northwest of center line of Missouri-Pacific Railroad track, approximately 0.5 mile west of Milepost 316, at center of cut, Section 30, T15N, R10W.
RM 38	55	315.14	State Survey standard disk, stamped B-26 1934, set in top of concrete post, 22 feet northwest of center line of main track of Missouri-Pacific Railroad, at Brother's spur, 14 feet southwest of end of spur track, 11.3 feet southeast of seventh pole northwest of Milepost 315, 113 feet southwest of southwest corner of station, 138 feet from north end of Bridge 42, SE1/4, SE1/4, Section 19, T15N, R9W.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 39	55	316.83	Standard disk, stamped A 43 1934, in top of southwest end of wing wall at north end of Bridge 40, 10 feet southwest of center line of Missouri-Pacific Railroad track, near sixteenth pole northwest of Milepost 313, Section 21, T15N, R9W.
RM 40	55	313.51	State Survey standard disk, stamped B-25 1934, set in top of concrete post, 21 feet northeast of center line of main track of Missouri-Pacific Railroad at Guion, 3.5 feet west of seventh pole northwest of Milepost 312, 14 feet south of southwest corner of loading bins of Silica Products Co. plant, NW1/4, SE1/4, Section 27, T15N, R9W.
RM 41	70	699.20	Spike in south side of 20-inch Red Oak, approximately 75 feet northeast of center line of Cove Road, NW1/4, Section 18, T14N, R10W, approximately 400 feet south of north east-west line of Section 18.
RM 42	70	679.43	Spike in west side of power pole, approximately 75 feet north of Cove Road, approximately 300 feet southwest of tributary to Mill Prong, SW1/4, Section 18, T14N, R10W, approximately 1,680 feet east of west north-south line of Section 18.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

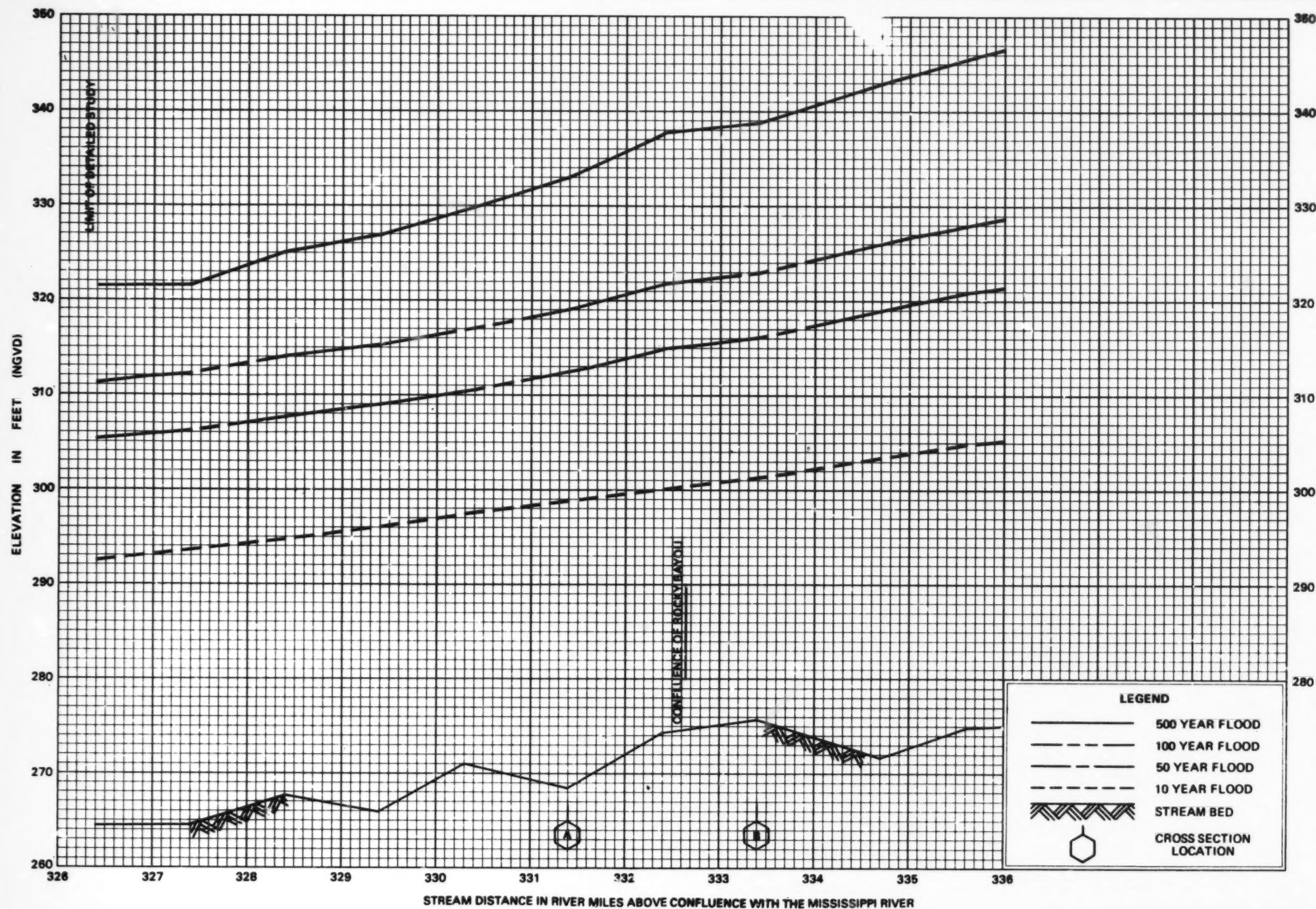
<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 43	75	392.22	Spike in east side of 16-inch Hackberry tree, in field along right bank of Rocky Bayou, SE1/4, Section 3, T14N, R10W, approximately 700 feet north of south east-west line of Section 3, approximately 1,400 feet west of east north-south line of Section 3.
RM 44	75	413.69	Spike in south side of 12-inch Walnut tree in field, approximately 1,040 feet north of north bank of Rocky Bayou, SW1/4, Section 3, T14N, R10W, approximately 1,910 feet east of west north-south line of Section 3.
RM 45	75	405.97	Spike in base of 30-inch Elm tree on right bank of Rocky Bayou, SE1/4, Section 4, T14N, R10W, approximately 670 feet west of east north-south line of Section 4, approximately 600 feet north of south east-west line of Section 4.
RM 46	75	429.44	Chiseled square in center of Highway 14 bridge over Rocky Bayou, Section 9, T14N, R10W.
RM 47	75	442.06	Spike in north side of 20-inch Elm tree, 6 feet north of pasture fence, 173 feet south of south bank of Rocky Bayou, SE1/4, Section 9, T14N, R10W, approximately 920 feet west of east north-south line of Section 9.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 48	75	465.83	Spike in north side of 14-inch Sweet Gum tree, 665 feet southwest of southwest bank of Rocky Bayou, Section 9, T14N, R10W, approximately 170 feet north of south east-west line of Section 9.
RM 49	75	651.74	Spike in south side of 14-inch Red Oak tree, 306 feet west of west bank of Mill Prong, Section 17, T14N, R10W, approximately 2,060 feet north of south east-west line of Section 17.
RM 50	75	581.86	Spike in north side of 8-inch pine tree, 252 feet north of north bank of Mill Prong, Section 17, T14N, R10W, approximately 1,870 feet west of east north-south line of Section 17.
RM 51	80	304.49	Standard disk, stamped B-43 1934, in south end of west concrete headwall of 12-foot by 12-foot concrete box culvert, 20.5 feet southwest of center line of Missouri-Pacific Railroad track, approximately 60-feet north-west of twenty-second pole northwest of Milepost 310, Section 35, T15N, R9W.

EXHIBIT 3 - ELEVATION REFERENCE MARKS - continued

<u>Reference Mark</u>	<u>FIRM Panel</u>	<u>Elevation (Feet NGVD)</u>	<u>Description of Location</u>
RM 52	100	621.11	Spike in base of west side of 12-inch Red Oak tree, approximately 70 feet north of Cove Road, approximately 260 feet northeast of bridge over tributary to Mill Prong for Cove Road, Section 18, T14N, R10W, approximately 2,000 feet west of east north-south line of Section 18.
RM 53	100	595.81	Chiseled square in center of east end of concrete-slab low-water bridge over Mill Prong for gravel road, approximately 95 feet east of center line of Cove Road, Section 17, T14N, R10W, on west north-south line of Section 17.



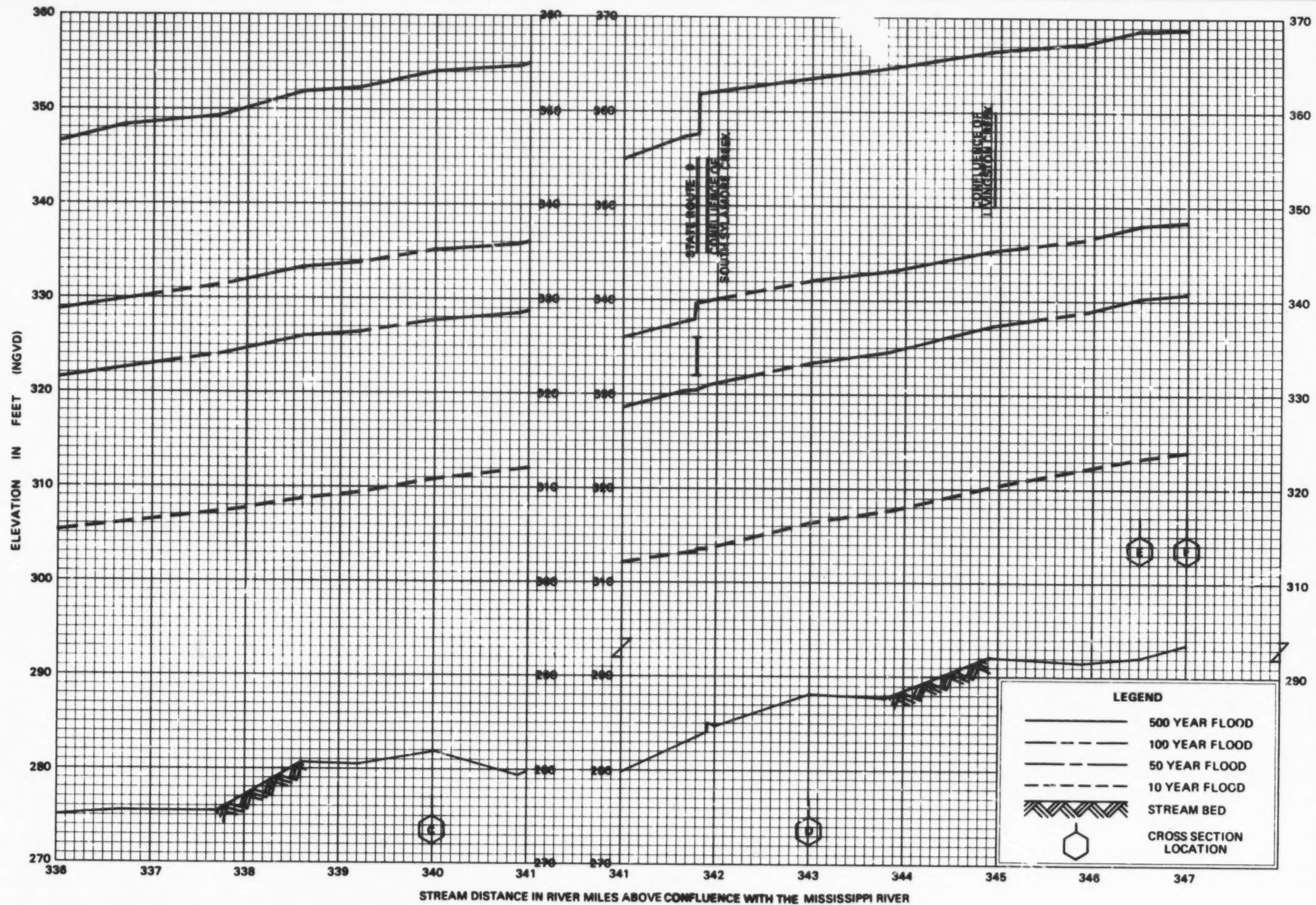
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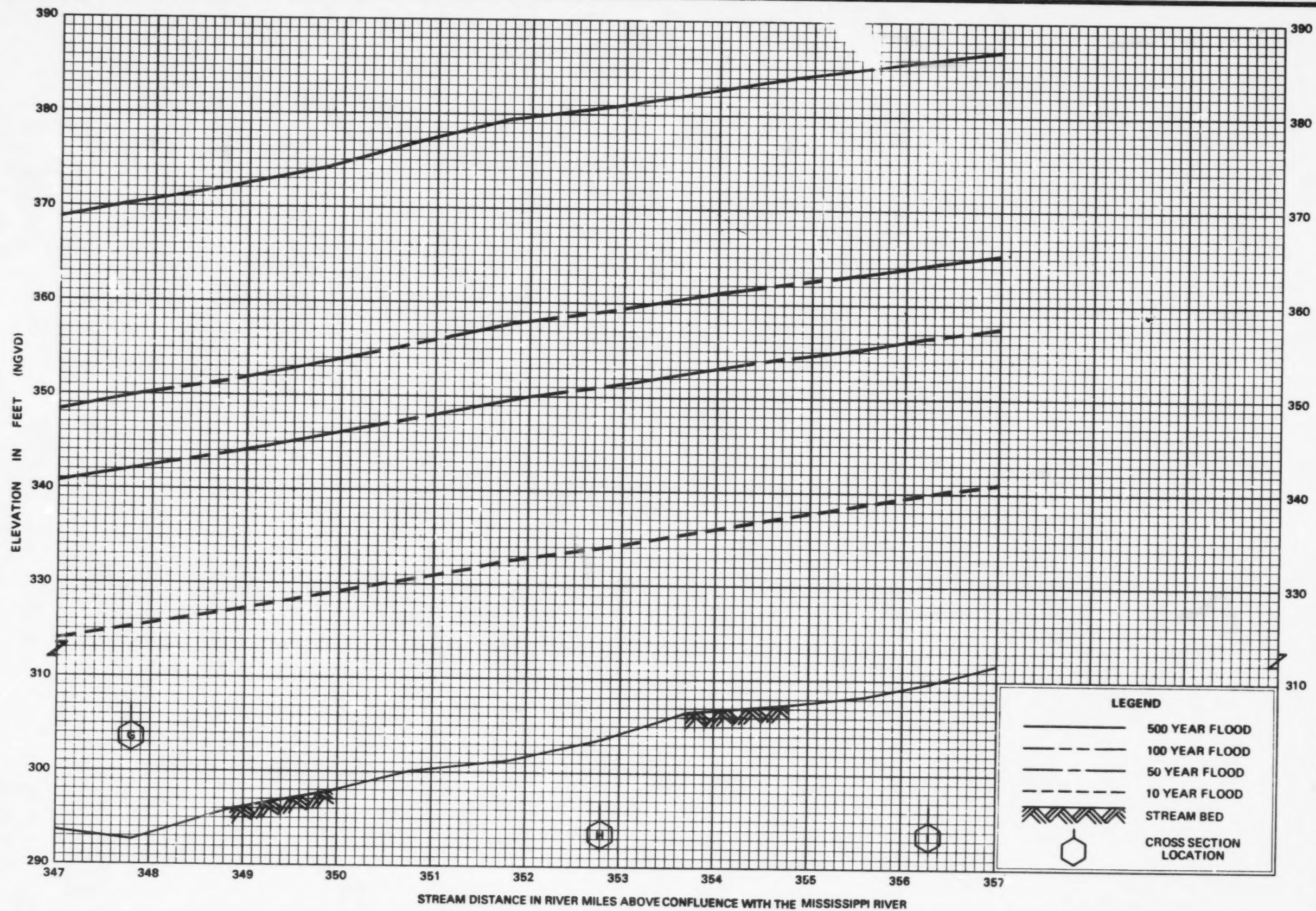
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STONE COUNTY, AR
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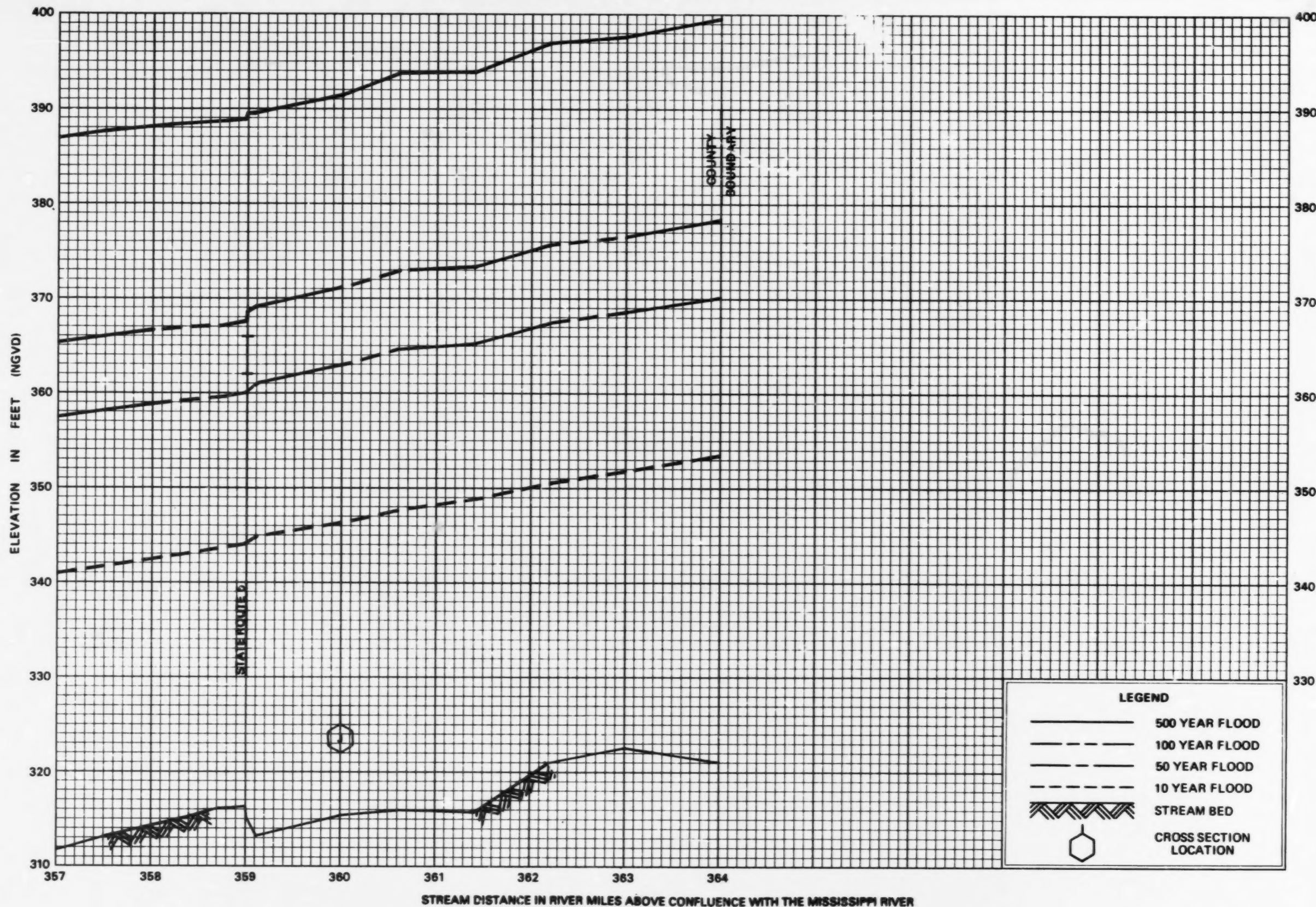
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WHITE RIVER

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STONE COUNTY, AR
(UNINCORPORATED AREAS)

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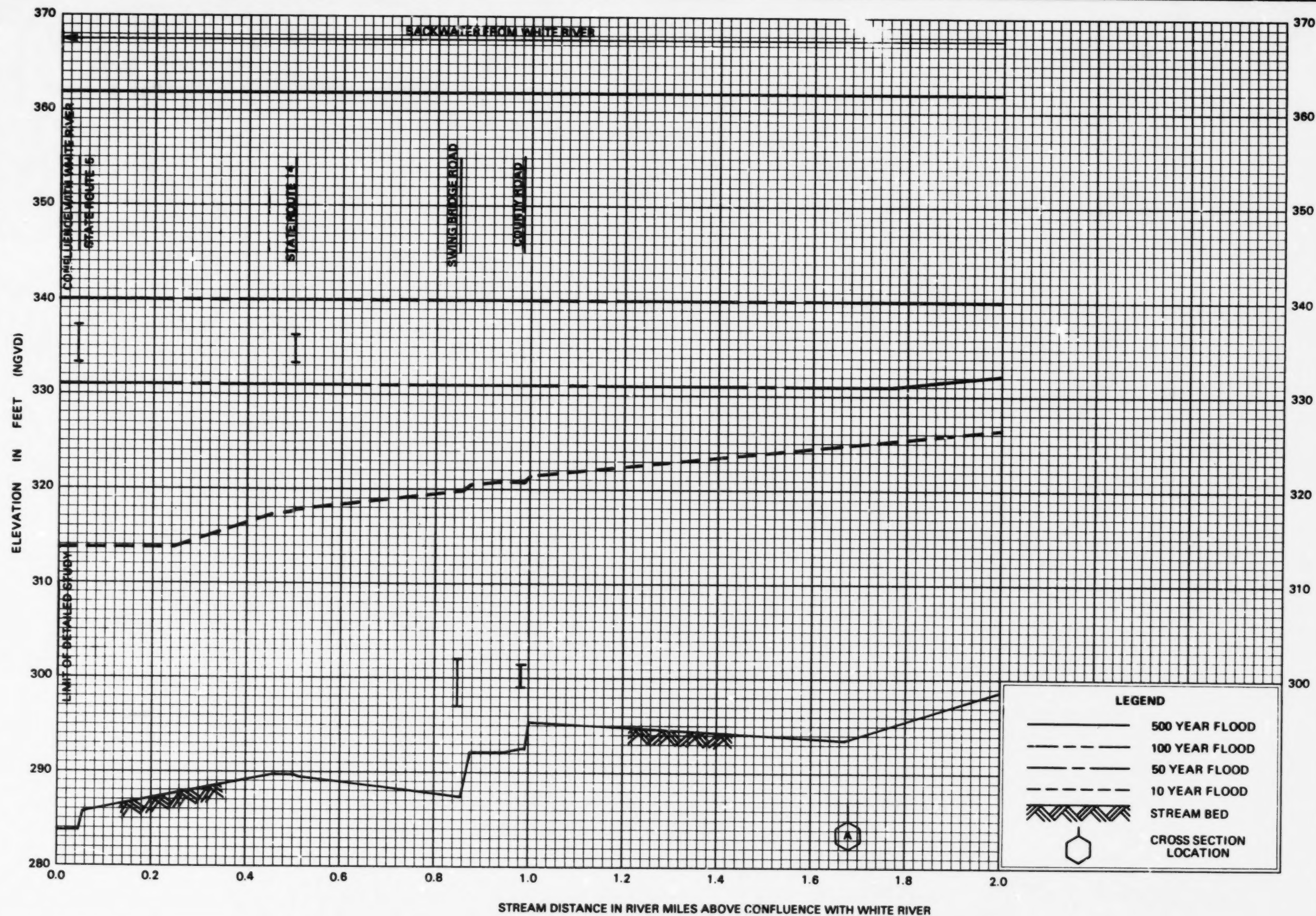
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STONE COUNTY, AR
(UNINCORPORATED AREAS)

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WHITE RIVER

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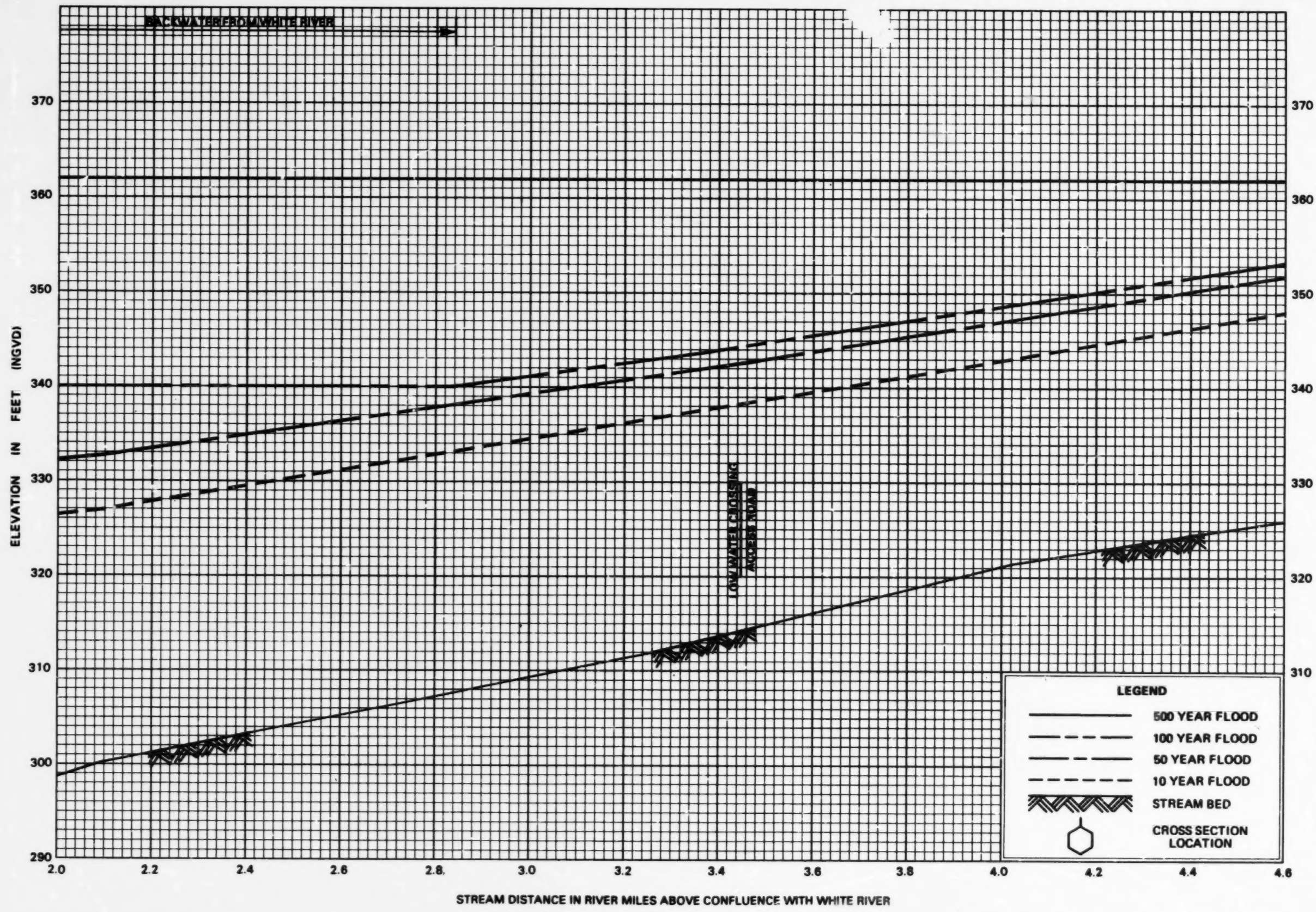
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SOUTH SYLAMORE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

STONE COUNTY, AR
(UNINCORPORATED AREAS)

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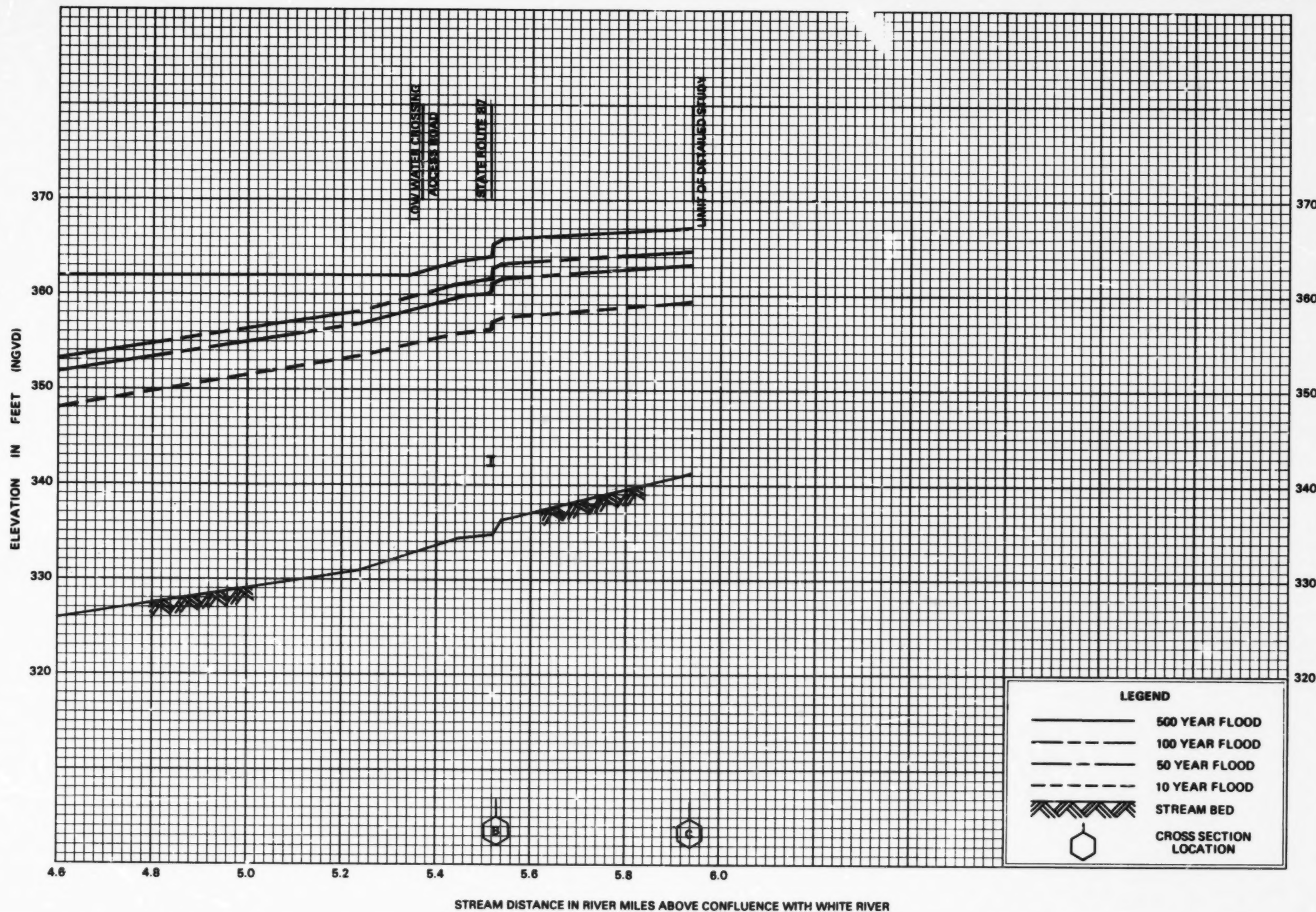


FLOOD PROFILES
SOUTH SYLAMORE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
STONE COUNTY, AR
 (UNINCORPORATED AREAS)

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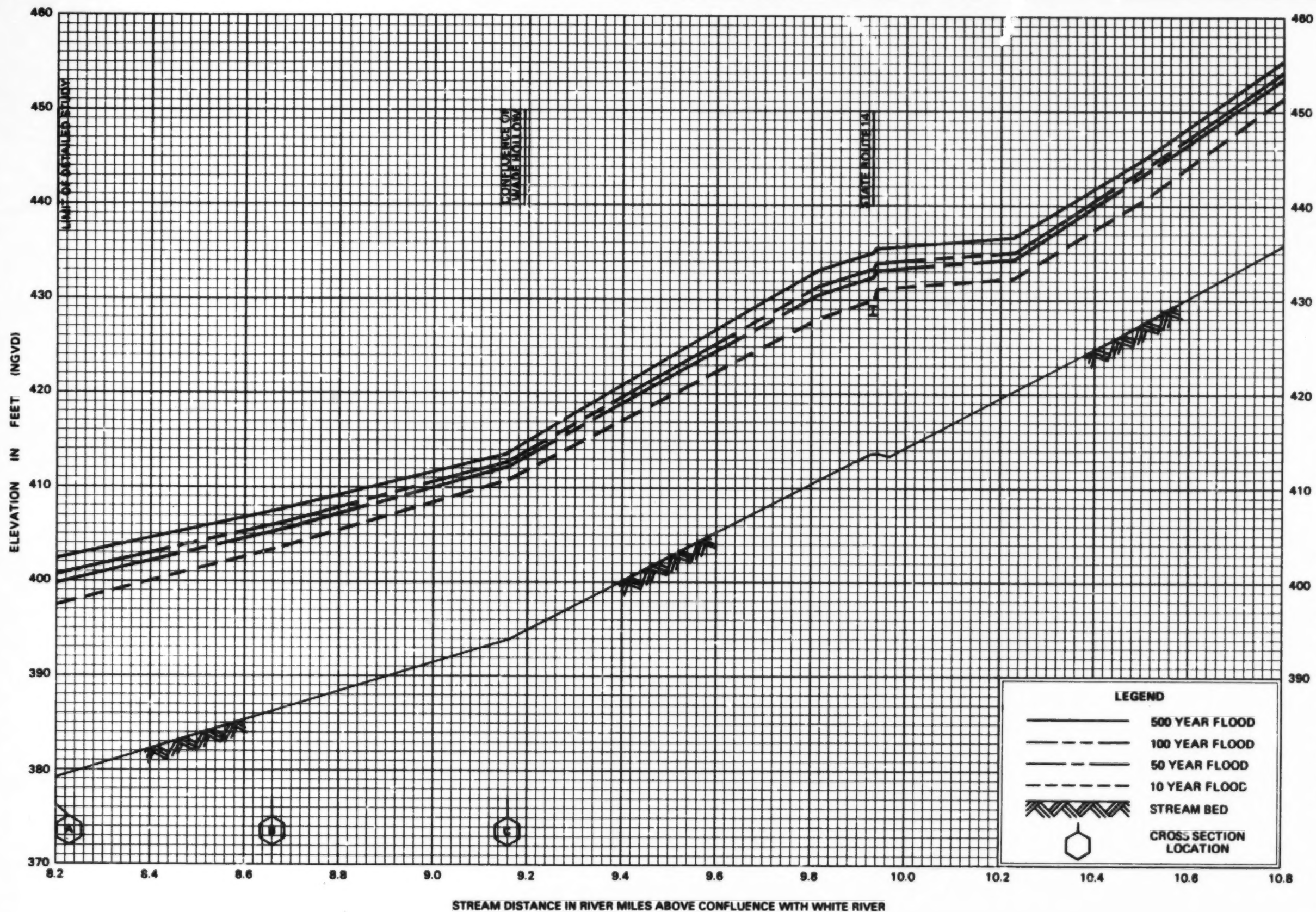


FLOOD PROFILES
SOUTH SYLAMORE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

STONE COUNTY, AR
(UNINCORPORATED AREAS)

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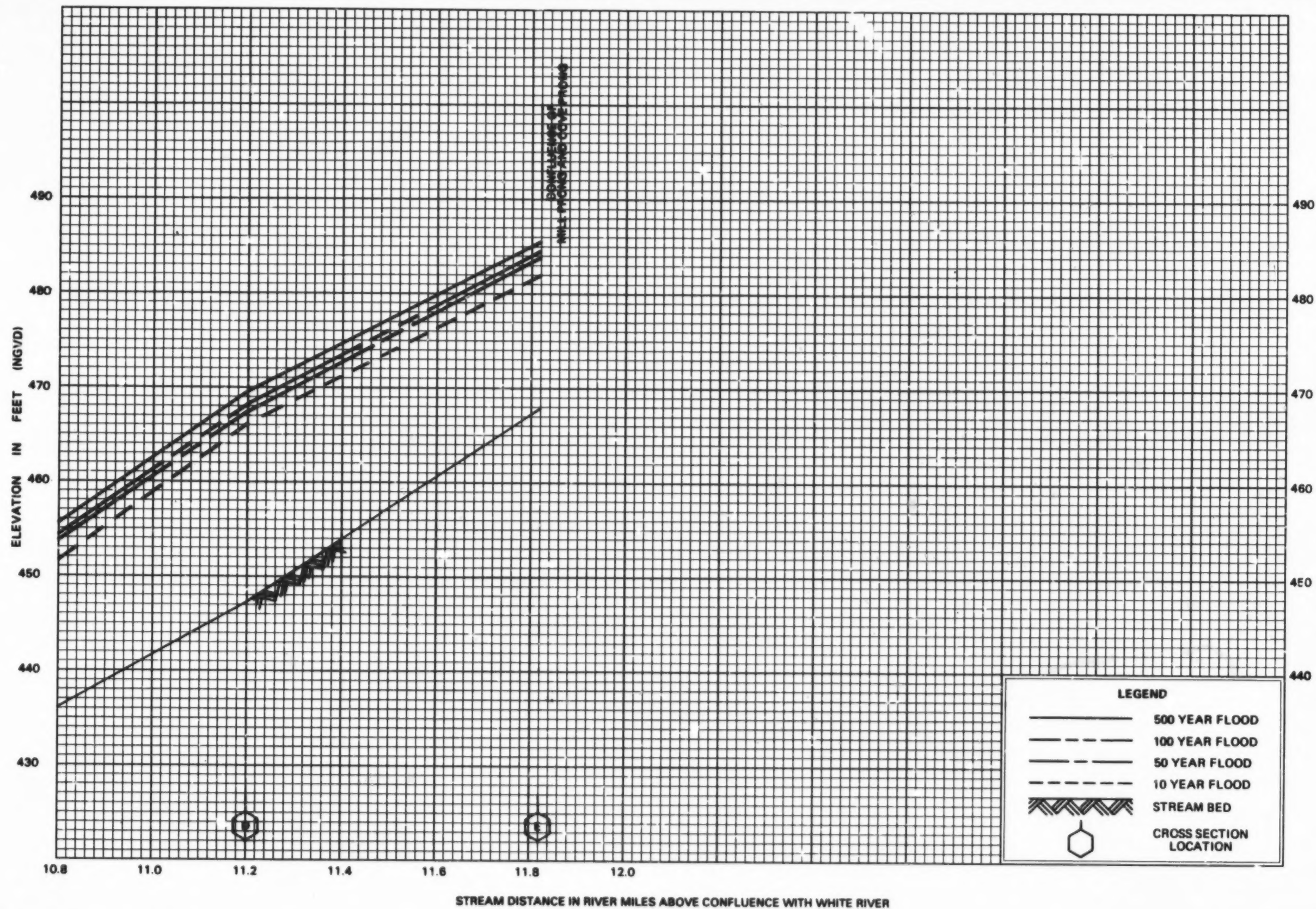
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ROCKY BAYOU

FEDERAL EMERGENCY MANAGEMENT AGENCY

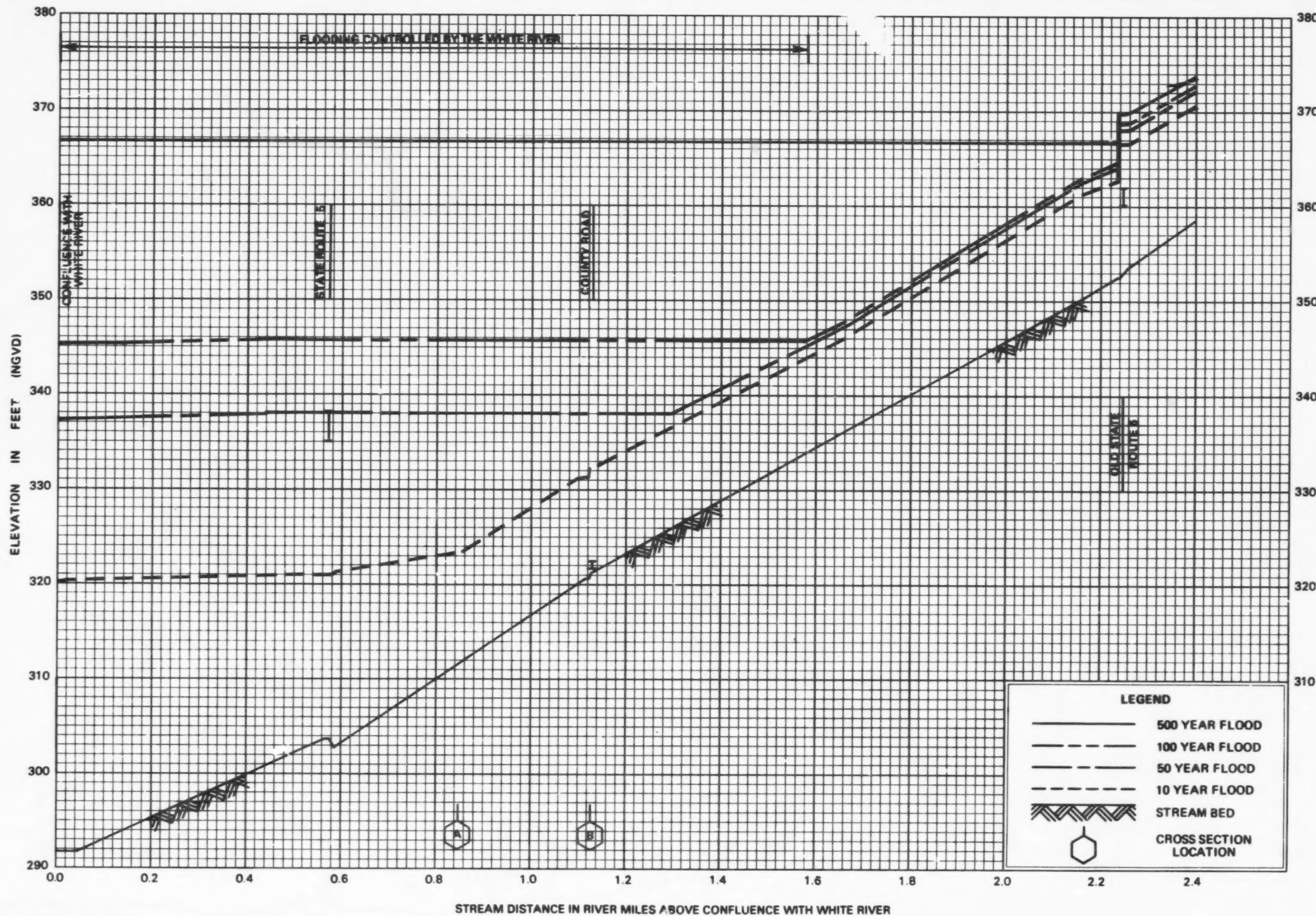
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FEDERAL EMERGENCY MANAGEMENT AGENCY

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ROCKY BAYOU



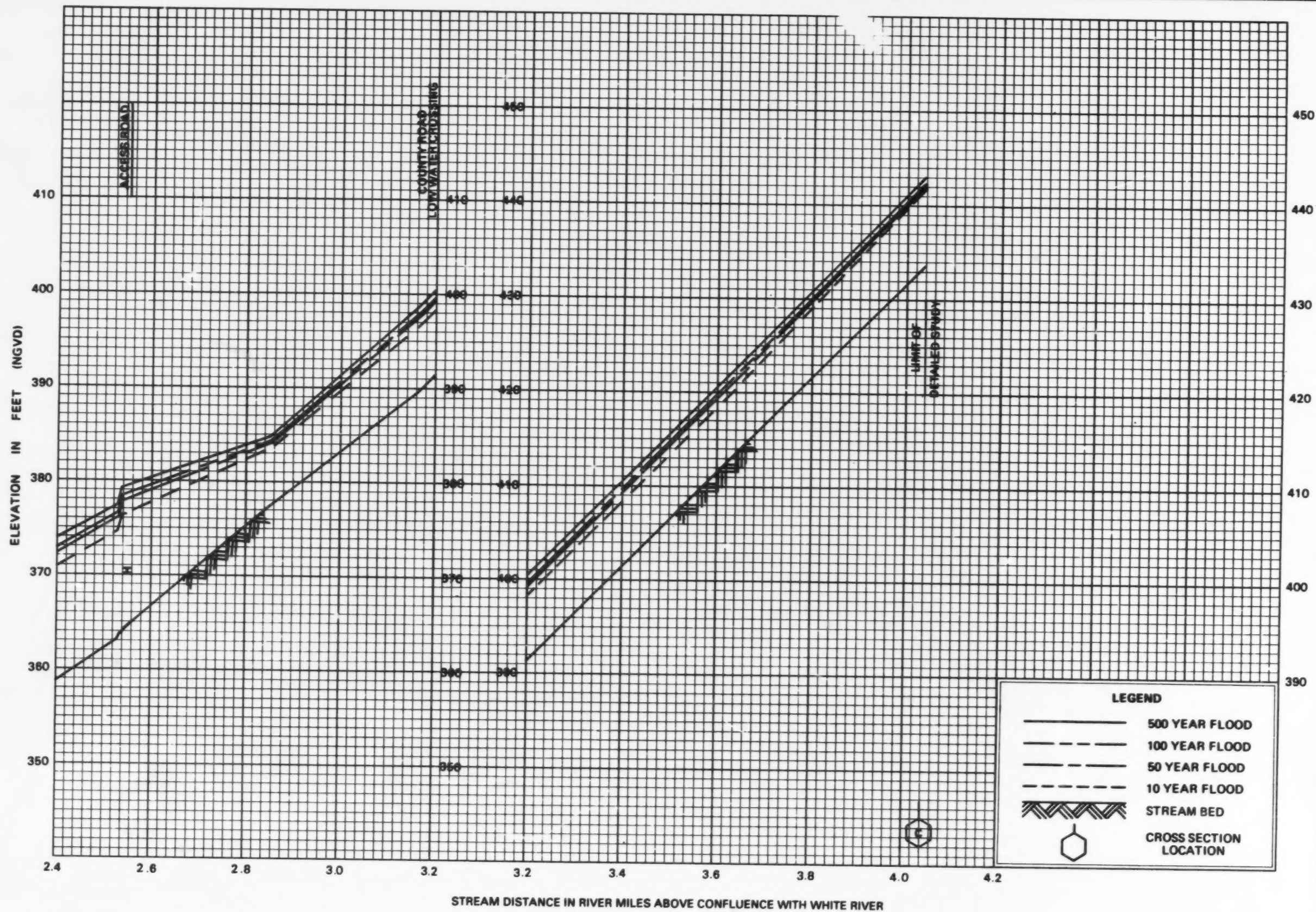
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LIVINGSTON CREEK

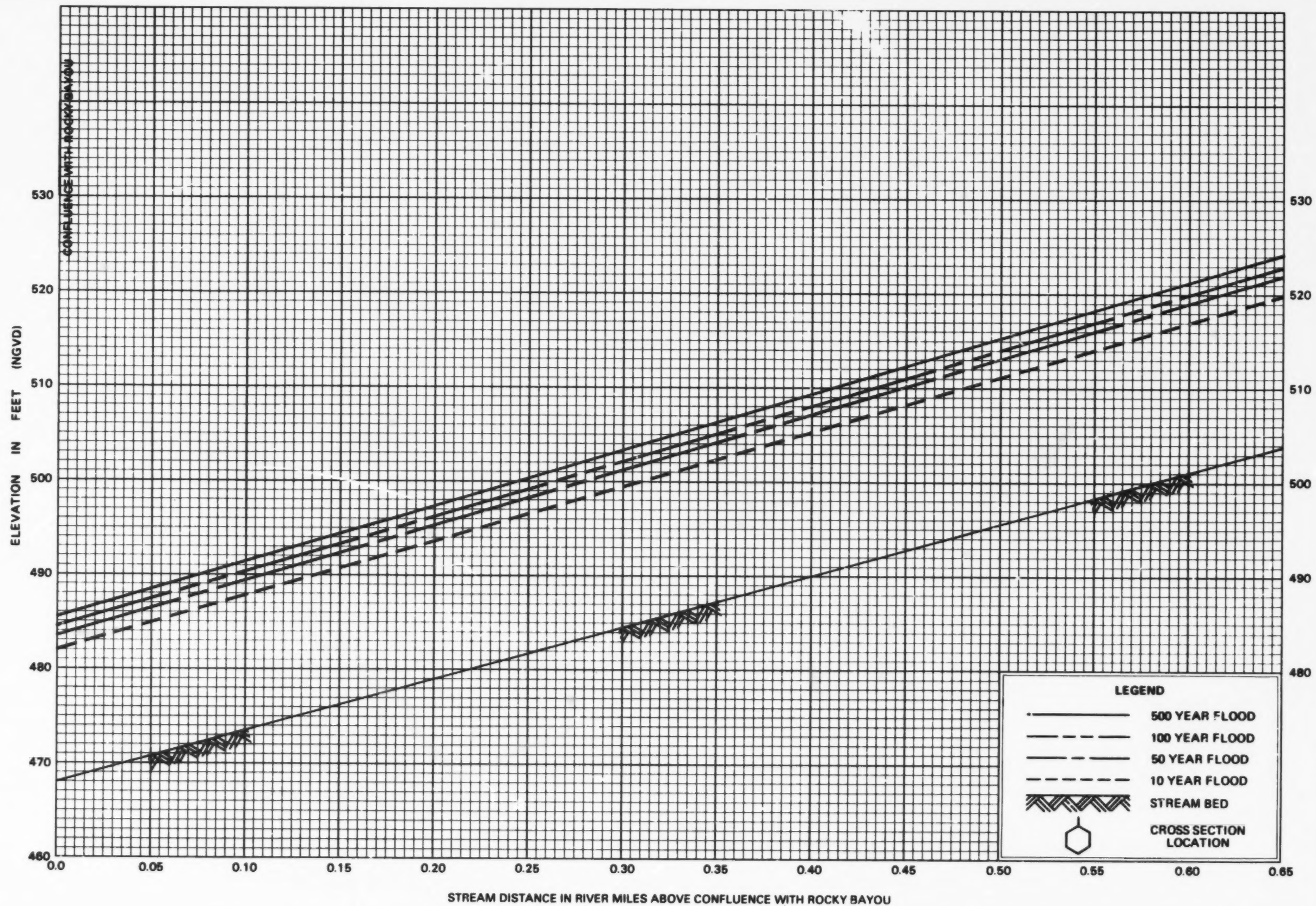
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FEDERAL EMERGENCY MANAGEMENT AGENCY



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MILL PRONG

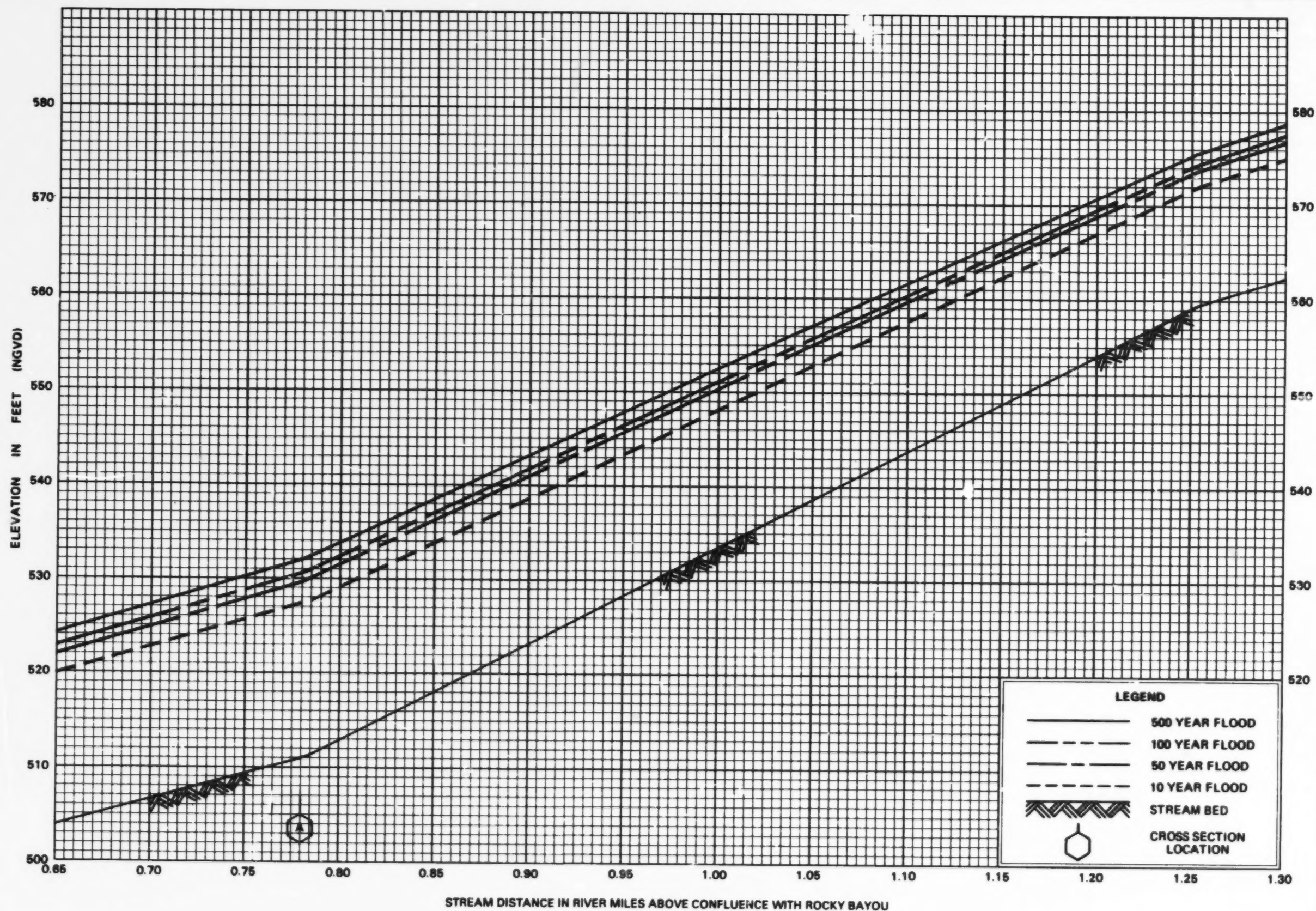
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STONE COUNTY, AR
(UNINCORPORATED AREAS)

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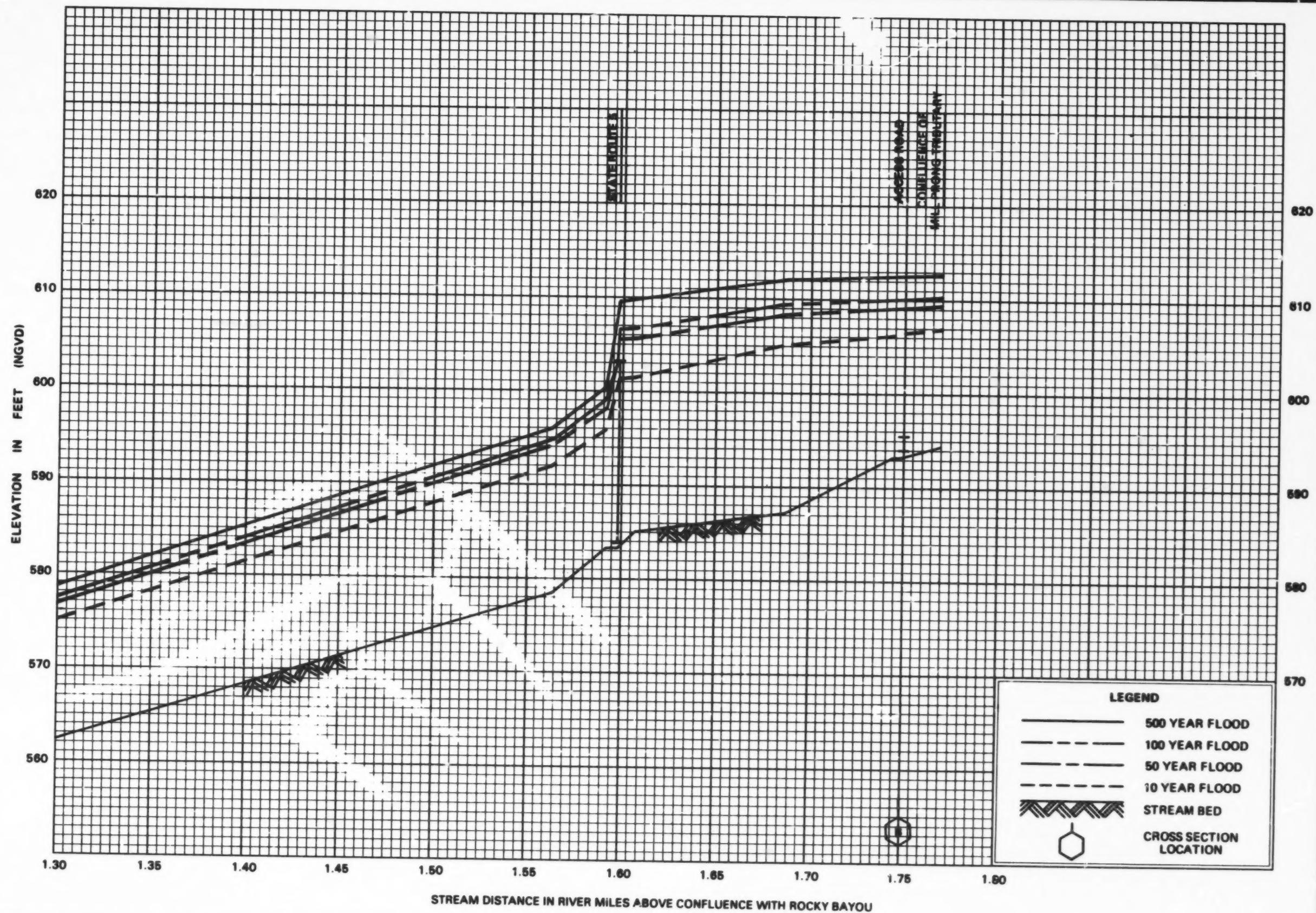
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STONE COUNTY, AR
(UNINCORPORATED AREAS)

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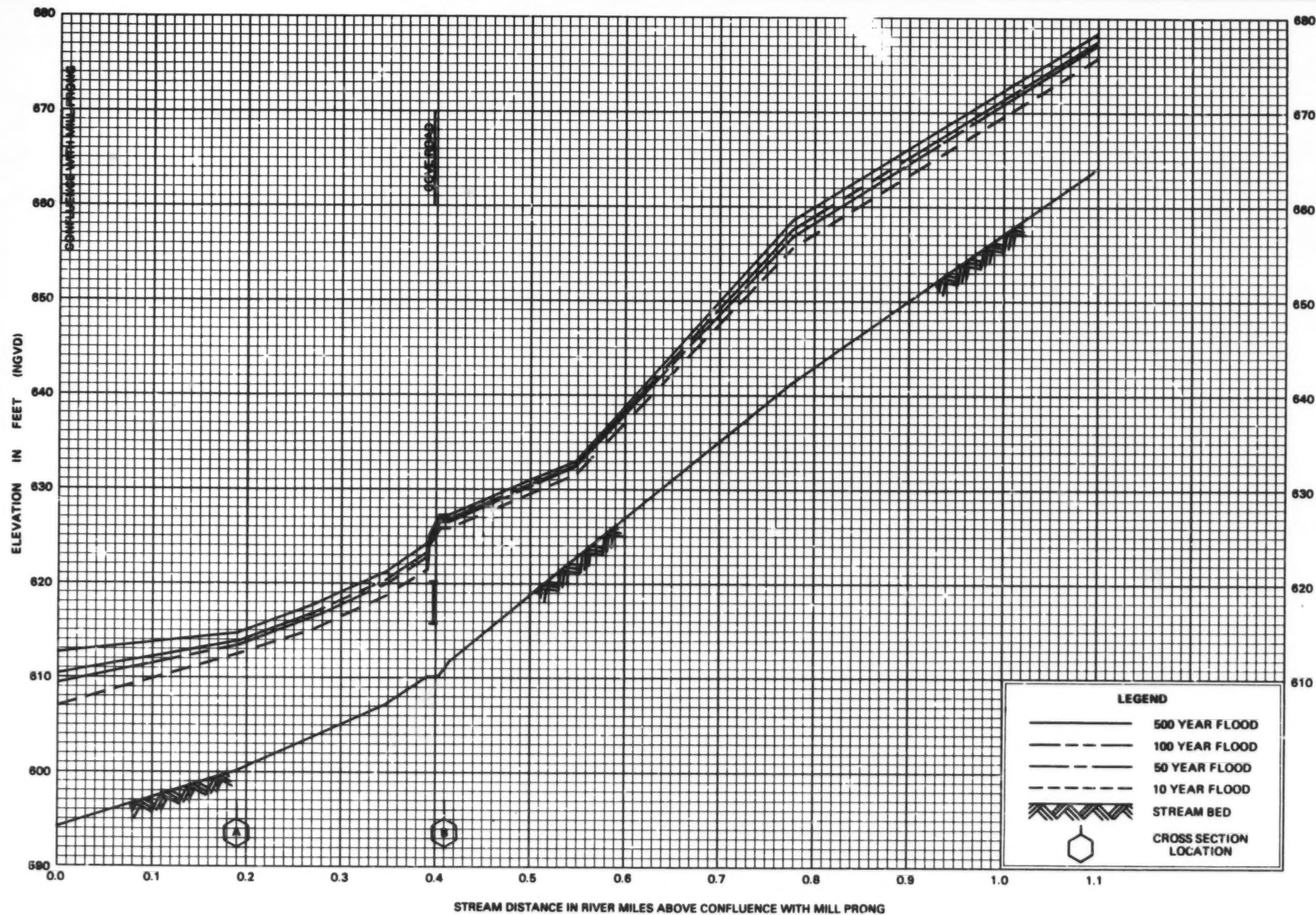
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STONE COUNTY, AR
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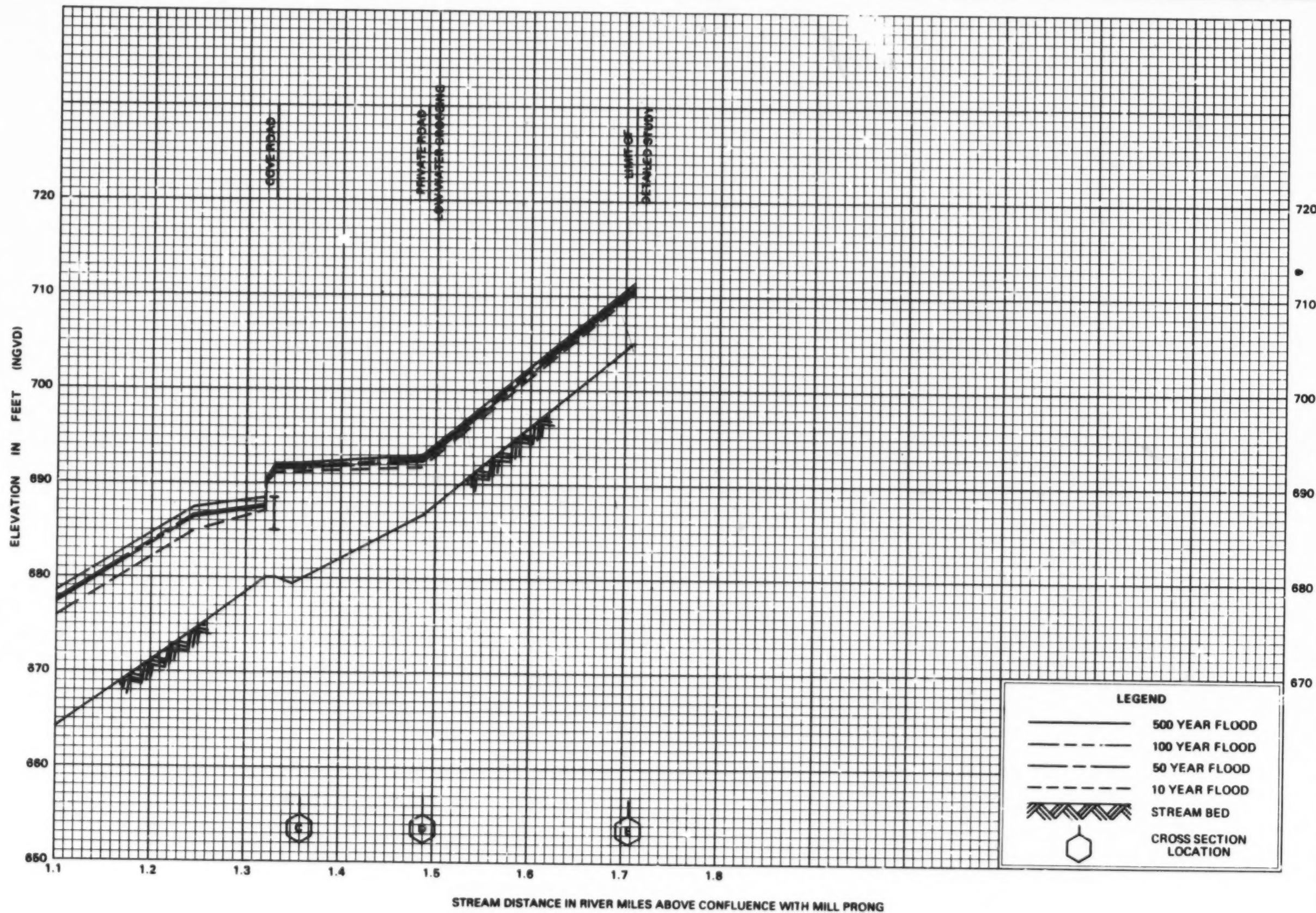


FEDERAL EMERGENCY MANAGEMENT AGENCY

FLOOD PROFILES
MILL PRONG TRIBUTARY

STONE COUNTY, AR
(UNINCORPORATED AREAS)

15P



FLOOD PROFILES

MILL PRONG TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

STONE COUNTY, AR
(UNINCORPORATED AREAS)